What Is Claimed Is:

1. An electrochemical sensor for measuring a concentration of nitrogen oxides in a gas to be measured in an exhaust gas of an internal combustion engine in a motor vehicle, comprising:

a first pump cell having a solid electrolyte which conducts oxygen ions;

a first pair of electrodes, situated on the first pump cell, which is connected to a first pump voltage, a first one of the first pair of electrodes being configured to be acted on by the gas to be measured via a diffusion path;

a second pump cell situated downstream from the first pump cell in a direction of gas flow and having a solid electrolyte which conducts oxygen ions; and

a second pair of electrodes, situated on the second pump cell, which is connected to a second pump voltage, a first one of the second pair of electrodes being configured to be exposed to a gas volume leaving the first pump cell, a second one of the second pair of electrodes being configured to be exposed to a reference gas;

wherein a second one of the first pair of electrodes of the first pump cell is configured to be exposed to the reference gas.

2. The sensor as recited in claim 1, wherein the first one of the first pair of electrodes is situated in a first inner chamber, and the first one of the second pair of electrodes is situated in a second inner chamber, the first inner chamber being connected to the gas to be measured, the second inner chamber being connected to the first inner chamber, and the diffusion path being formed in the first inner chamber.

3. The sensor as recited in claim 2, wherein the diffusion path is formed by the first one of the first pair of electrodes, which fills the entire first inner chamber.

4. The sensor as recited in claim 2, wherein the diffusion path is a diffusion channel in the first inner chamber which extends over the first one of the first pair of electrodes of the first pump cell.

5. The sensor as recited in claim 4, wherein the diffusion channel is filled with a porous diffusion material.

6. The sensor as recited in claim 1, wherein the first one of the first pair of electrodes of the first pump cell is made of catalytically inert material.

7. The sensor as recited in claim 2, wherein a cavity connected to the inner chamber is between the first inner chamber and the second inner chamber.

8. The sensor as recited in claim 7, wherein a cross section of the cavity is a multiple of a cross section of an opening into the first and second inner chambers in the cavity.

9. The sensor as recited in claim 2, wherein a diffusion path is situated upstream from the first one of the second pair of electrodes in the second pump cell.

10. The sensor as recited in claim 9, wherein the diffusion path is formed by the first one of the second pair of electrodes in the second pump cell which fills the entire second inner chamber.

11. The sensor as recited in claim 9, wherein the diffusion path is a diffusion channel extending in the second inner chamber over the first one of the second pair of electrodes of the second pump cell.

12. The sensor as recited in claim 11, wherein the diffusion

channel is filled with a porous diffusion material.

13. The sensor as recited in claim 1, wherein the first pump voltage is a direct-current voltage whose value is selected so as to avoid decomposition of nitrogen oxides contained in the gas to be measured, and the second pump voltage is a constant direct-current voltage having a higher value than that of the first pump voltage.

14. The sensor as recited in claim 13, wherein the first pump voltage is configured to be adjusted to a change in the oxygen concentration in the gas to be measured.

15. The sensor as recited in claim 14, wherein the first pump voltage is adjusted in such a way that an oxygen concentration in the gas to be measured reaching the first one of the second pair of electrodes of the second pump cell is not influenced by the oxygen concentration in the gas to be measured.

16. The sensor as recited in claim 13, wherein a pump current flowing through the first pump cell as a function of the oxygen concentration is stored along with the first pump voltage as a parameter in a characteristics map, and the pump current flowing through the first pump cell is measured and, using the measured value, an instantaneous change in the oxygen concentration is read from the characteristics map, and a variable for the change in the voltage is calculated from the ratio of the change in concentration to the oxygen concentration in the gas to be measured.